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The invention relates to a method to the production of polyester films also on it applied transponders as well as such polyester films as semi-finished material. The invention relates to furthermore products and their production, are in-laminated in which such polyester films with transponder for the purposes of the contactless data transfer, in particular with integrated switching circuits equipped value documents such as z. B. Sticker, cards and trailers.

Transponders are electronic transfer elements, which cover an antenna and or several electronic components to contactless sending and receiving information. In connection with extreme thin, contactless working electronic subject-matters of the daily life, like stickers, trailers, chip cards and other value documents, the transponder antenna is formed, which is electrically connected with the electronic component, as antenna coil, in particular thus with a IC chip.

The antenna coil, which can consist of copper, aluminium in addition, of silver or another electric conductive material, becomes frequent provided on a carrier foil from polyester (PET). The antenna coil forms a constituent of the conductive strip structures. Whereupon then the other structural elements of the transponder become applied. The advantage of the use of polyester films consists of the fact that polyester is suitable due to its high temperature stability, its high mechanical strength and its low materials price particularly good for the applique transponders.

A disadvantage of polyester films consists of the fact that they can be laminated not so easily with partner materials to fixed composite. A fixed composite is however substantial from safety reasons straight for the production of value documents with integrated, contactless working chips.

In the EP 0,595,549 a2 will in connection with identification labels for luggage trailer proposed, the transponder existing from in Electroform, present on a polyester film to cover corroding or Screenprintingverfahren manufactured antenna coil and a chip applied in Flip chip technique with a self adhesive polyester layer. Beyond that will the polyester transparency on the opposite side with an adhesive layer provided, in order to be able to attach the identification label at a luggage trailer.

Object of the instant invention is it to also place a method to the production of polyester films on it to applied transponder or at least the transponder antenna coil as well as corresponding semi-finished material to the order which are particularly suitable for the subsequent Lamination with partner materials. An other object of the invention consists of it, a method to the production of laminated subject-matters, in particular with integrated switching circuits equipped value documents such as labels, chip cards and trailers, to make available as well as the corresponding subject-matters themselves, in which such semi-finished material are to purposes of a contactless data transfer in-laminated.

This object becomes the dissolved by the features in the independent claims indicated methods, semi-finished material and subject-matters.

Those of it dependent claims concern advantageous embodiments and developments of the invention.

Therefore a polyester film becomes used, which possesses a laminatable coating, and which becomes antenna coil of the transponder only subsequent applied. Such a polyester film with transponder antenna coil and if necessary. a semi-finished material, which can become laminated during the subsequent treatment the production for example a chip card easily with other layers, forms for other transponder construction units. In particular it is not required during the subsequent treatment to plan additional adhesive layers in order to connect an other layer with the polyester film. Thus time and cost-intensive process step is void with the production of the final products.

The laminatable coating can be in accordance with an embodiment of the invention an adhesive layer, which is however according to invention constituent of the polyester film before application of the transponder. The conjunction of the polyester film with the adhesive layer takes place thus to a time, which can lie far before the subsequent treatment of the semi-finished material to the finished product. In particular the polyester film including its adhesive coating at other location generated, on large supply rolls stored and the location of the semi-finished material production and the subsequent treatment can become the final product transported.

⚡ [top](#) If the polyester film is to lie in the final product between two layers, a preferable embodiment of the invention plans that the polyester film is reciprocal provided with the laminatable coating.

In accordance with one preferable embodiment of the invention the polyester film including its laminatable single or reciprocal coating in the Coextrusionsverfahren particularly becomes manufactured. As particularly suitable laminatable coating thereby a coating material from amorphous polyester (PETG) proved. Amorphous polyester forms a stable composite with polyester in the Coextrusionsprozess and is beyond that for the Lamination bottom application of pressure and temperature with many other plastic materials suitable.

The transponder covers additional to the antenna formed as bobbin as electronic component for example an integrated

circuit. The bobbin can become from electric conductive material in conventional techniques manufactured, which become also used for the production of printed switching circuits. The conductive traces of the antenna coil are worked out for example in an etching process from a metal coating covering the laminatable coating. Simple electronic circuits can become simultaneous along-generated. Preferably however a chip in Flip chiptechnique, gedünnter on less than 25 μm , becomes applied on the contact terminals of the antenna coil.

Particularly a suitable method to the generation of the conductive strip structure of the antenna coil exists in a washing process, which becomes described in the DE 197 39 193 A1 the generation of a negative inscription on a note safety thread. Afterwards first in the conductive strip-free areas of the polyester film an ink with high pigment portion of printed, subsequent is vaporized the polyester film metallic and finally washed off the ink, which forms a porous, raised structure on the polyester film, so that only those stay the antenna coil formed conductive strip structures.

Subsequent one becomes the invention exemplarily on the basis the accompanying designs explained. In it show:

Fig. 1 a polyester film with antenna coil as semi-finished material;

Fig. 2 a cutout of the polyester film from Fig. 1 in the cross section;

Fig. 3 the polyester film in accordance with Fig. 2 with applied chip and cap layer; and

Fig. 4 the polyester film from Fig. 3 with reciprocal laminatable coating and reciprocal cover sheets.

Fig. 1 shows a polyester film 1 as the first semi-finished material with one to it in the etching process or in the before-described washing process in accordance with the teaching of the DE 197 39 193 A1 generated antenna coil 2. The antenna coil 2 possesses a contact area of 3 electronic components other to the contact at its two ends in each case, in particular to the contact of a chip in Flip chiptechnique. The polyester film 1 in accordance with Fig. 1 has for example the lengthening and width dimensions of a conventional chip card after ISO standard. Them become preferably before or punched after the application of the antenna coil 2 from a large web, which can be stored on supply rolls, cut or.

Fig. 2 shows a cutout of the polyester film after Fig. 1 as cross section by the coil connections 3. The polyester film 1 consists of a polyester transparency 1a, which is provided single with a laminatable coating 1b. During the laminatable coating 1b it concerns either an adhesive material, which becomes before the generation of the antenna coil 2 on the polyester transparency 1a applied, or around a layer from amorphous polyester (PETG), which common becomes manufactured with the polyester transparency 1a in the Coextrusionsverfahren. As adhesive materials for example polyester copolymer systems or PU systems application find.

In Fig. 3 is the polyester film from Fig. 2 as further processed semi-finished material shown, whereby a gedünnter chip with its contacts 5 is 2 applied as Flip chip on the contact terminals 3 of the bobbin. On the chip arrangement immediate becomes following the chip application a stabilizing film 6 laminated. Alternative one can become in place of the stabilizing film a stabilizing paint layer applied. The stabilizing film and/or. Paint layer serves the protection on bottom 25 μm thick extreme gedünnter chip before mechanical stress and other environmental influences.

The semi-finished material in accordance with Fig. 3 subsequent finished products processed can become, in particular value documents such as labels, credit, money or badges, trailers and such a thing with integrated chip. For example the semi-finished material can become the production of an IC card with an upper coating layer 7 bottom application of pressure and temperature laminated, like this in Fig. 4 shown is. With in Fig. the polyester film 1 different from the before described embodiment reciprocally to its polyester inertial layer 1a a laminatable coating 1b possesses 4 illustrated embodiment, and of the polyester film 1 cover sheets 7 laminated are reciprocal.

Preferably 7 map materials come made of PVC, ABS, polycarbonate, PETG, Melinex, PMMA and polyolefins to the use for the cover sheets.